Investigating infections of *Mycobacterium* in delta smelt (*Hypomesus transpacificus)* from the San Francisco Estuary

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Abstract: Investigations on threatened or endangered species seldom consider pathogens, disease, and host health assessments on building a case for factors related to environmental alterations or climate change. Thus, pathogens, diseases, and host health status are one of the least studied stressors affecting threatened species in the San Francisco Estuary (SFE), but are intricately related to the health of the entire ecosystem. The delta smelt (*Hypomesus transpacificus*) is ecologically and economically important in the SFE hence the focus of intensive studies. In the last decade, the presence of a chronic and untreatable bacterial infection associated with *Mycobacterium* has been observed among delta smelt in production facilities charged with the propagation of refugial populations (Fish Conservation and Culture Lab, UC Davis) and broodstock management (Livingston Stone National Fish Hatchery, Shasta Lake) including laboratory-based research programs. *Mycobacterium* is ubiquitous infecting a wide spectrum of aquatic and terrestrial poikilotherms, birds, and mammals, including humans. In other ecosystems such as the Chesapeake Bay, several *Mycobacterium* species have been implicated as disease agents in striped bass (*Morone saxatilis*) and Atlantic menhaden (*Brevoortia tyrannus*), raising alarms of the health status of the bay. Current reporting of *Mycobacterium* and/or disease prevalence among delta smelt populations is dependent on the detection methods being employed: molecular tools (exposure), bacterial culture (infection), and histopathology (disease). Based on our results and previous studies, this presentation will provide an overview of our current knowledge of exposures to *Mycobacterium* among wild delta smelt populations and how key environmental factors affect the disease progression under captive conditions. Environmental factors may play a critical role influencing the incidence and prevalence of mycobacteriosis throughout this critical ecosystem. By understanding how environmental changes can affect the role disease pathogens play, we may be better able to devise effective mitigation strategies to help save endangered and threatened species.

Statement of Relevance: Knowledge on *Mycobacterium* prevalence in delta smelt provides insights on the pathogen role to fish survival in captivity and in the field. Determining *Mycobacterium* incidence in delta smelt and in other introduced species (e.g. Chinook salmon, striped bass, Sacramento splittail) is relevant to management of aquatic resources in the SFE.